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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,938	03/11/2004	Douglas R. Svenson	046088/267693	4873

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EXAMINER	
WHITE, EVERETT NMN	

ART UNIT	PAPER NUMBER
1623	

DATE MAILED: 11/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/797,938	SVENSON ET AL.	
	Examiner	Art Unit	
	Everett White	1623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-46 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-46 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 11 March 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3/11/2004.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 5 and 38 is objected to because of the following informalities: In Claim 5, line 3 and Claim 38, line 2, the phrase "as ISO brightness" should be changed to - - an ISO brightness - -. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 16, 31 and 35-46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In **Claim 16**, line 2, the phrase "hydrolyzing step" should be changed to - - acid hydrolyzing step - - in order to make the claim more definite.

In **Claim 31**, line 3, the unit of measurement for the recited molecular weight value has not been set forth which renders the claim indefinite. It is not clear in the claim if the molecular weight unit of measurement is Daltons, kilodaltons, or some other unit of measurement.

In **Claim 35**, line 1, the term "high" in the phrase "high-purity xylose product" is a relative term, which renders the claim indefinite. The term "high" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. **Claims 36-46**, which are dependent from Claim 35, are also rejected since these claims do not clarify the term "high" in the phrase "high-purity xylose product".

In **Claim 43**, the phrase "acidified concentrated hemicellulose solution" lacks clear antecedent basis since said phrase has not been previously set forth in Claims 35 and 42, the claims from which Claim 43 is dependent from.

In **Claim 44**, the phrase "acidifying step" lacks clear antecedent basis since said phrase has not been previously set forth in Claims 35 and 42, the claims from which Claim 44 is dependent from.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Heikkila et al (US Patent No. 6,512,110).

Applicants claim a method of producing xylose from a cellulose material containing hemicellulose, comprising: providing a cellulose pulp that is at least partially bleached and has a hemicellulose content that is predominantly xylan; extracting the hemicellulose from the at least partially bleached pulp into a caustic solution thereby forming a hemicaustic solution; separating the hemicaustic solution into a concentrated hemicellulose solution and a concentrated caustic solution; and, hydrolyzing the hemicellulose from the concentrated hemicellulose solution to produce xylose.

The Heikkila et al patent discloses a process for the production of xylose from a paper-grade, hardwood pulp. More specifically, the Heikkila et al patent disclosed that the invention thereof relates to a process wherein the xylan contained in said pulp is extracted using an aqueous solution of a xylanase enzyme. Optionally, the process also comprises one or two alkali treatments. Heikkila et al discloses that the xylose is obtained by a hydrolysis of the xylan extracted from the pulp. Heikkila et al discloses that the paper-grade hardwood pulp used as raw material is preferably soda pulp or kraft pulp (see column 1, lines 8-16). See column 12, 2nd paragraph for the procedure used to separate the hemicaustic solution into a caustic solution and a hemicellulose solution (i.e., xylan). Treatment of the pulp with xylanase enzyme in the Heikkila et al patent is within the scope of the instantly claimed step of providing a cellulose pulp that

is at least partially bleached. The Heikkila et al patent teaches that hardwood pulp comprises hemicellulose at 25-35% (see column 1, lines 50 and 51), which anticipates a pulp having greater than 4 wt% of hemicellulose as set forth in instant Claim 2. The process for the production of xylose disclosed in the Heikkila et al patent anticipates the method of producing xylose from a cellulose material containing hemicellulose of instant Claims 1 and 2.

Claim Rejections - 35 USC § 103

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heikkila et al (US Patent No. 6,512,110).

Applicants claim a method of producing xylose from a cellulose material containing hemicellulose, comprising: providing a cellulose pulp that is at least partially bleached and has a hemicellulose content that is predominantly xylan; extracting the hemicellulose from the at least partially bleached pulp into a caustic solution thereby forming a hemicaustic solution; separating the hemicaustic solution into a concentrated

hemicellulose solution and a concentrated caustic solution; and, hydrolyzing the hemicellulose from the concentrated hemicellulose solution to produce xylose. Additional limitations in the dependent claims include the method wherein the pulp provided is hardwood pulp and comprises a specific amount of hemicellulose; the method wherein the hemicellulose in the provided pulp is greater than 85 wt% xylan; the method wherein the pulp provided is subjected to a series of oxidation and extraction stages until greater than 80 wt% of the original lignin content of the pulp has been removed or until the pulp has as ISO brightness of 88% or higher; the method wherein the step of extracting the hemicellulose from the pulp comprises the use of cold caustic treatment; and the method wherein the caustic solution has a specific pH and temperature value. Also claimed is a xylose production system comprising: a supply of at least partially bleached cellulose pulp having a hemicellulose content that is greater than 85% xylan; an alkaline treatment system capable of extracting hemicellulose from the bleached pulp into a hemicaustic solution; a separation system capable of separating the hemicaustic solution into a purified concentrated caustic solution and a concentrated hemicellulose solution; and, a hydrolysis unit capable of hydrolyzing the xylan content of the concentrated hemicellulose solution to xylose. Further claimed is a process for producing a high-purity xylose product from a cellulose material, comprising the steps of: at least partially chemically bleaching a cooked cellulose pulp; using a cold caustic treatment to extract hemicellulose from the at least partially bleached cellulose pulp into a caustic solution thereby forming a hemicaustic solution; separating the hemicaustic solution by nanofiltration into a concentrated hemicellulose solution and a concentrated caustic solution; and, hydrolyzing the hemicellulose from the concentrated hemicellulose solution.

The Heikkila et al patent discloses a process for the production of xylose from a paper-grade, hardwood pulp. More specifically, the Heikkila et al patent disclosed that the invention thereof relates to a process wherein the xylan contained in said pulp is extracted using an aqueous solution of a xylanase enzyme. Optionally, the process also comprises one or two alkali treatments. Heikkila et al discloses that the xylose is obtained by a hydrolysis of the xylan extracted from the pulp. Heikkila et al discloses

that the paper-grade hardwood pulp used as raw material is preferably soda pulp or kraft pulp (see column 1, lines 8-16). See column 12, 2nd paragraph for the procedure used to separate the hemicaustic solution into a caustic solution and a hemicellulose solution (i.e., xylan). Treatment of the pulp with xylanase enzyme in the Heikkila et al patent is within the scope of the instantly claimed step of providing a cellulose pulp that is at least partially bleached. The Heikkila et al patent teaches that hardwood pulp comprises hemicellulose at 25-35% (see column 1, lines 50 and 51), which embraces a pulp having greater than 4 wt% of hemicellulose as set forth in instant Claim 2. Also see column 2, 2nd paragraph wherein the Heikkila et al patent further teaches a method of removing pulp using bleaching and alkaline extraction. In this paragraph, Heikkila et al discloses that "bleaching" is the removal of color from pulp, primarily the removal of traces of lignin, which remains bound to the fiber after the primary pulping operation. Heikkila et al teaches that bleaching usually involves treatment with oxidizing agents, such as oxygen, peroxide, chlorine, or chlorine dioxide. Classically, the pulp is treated with chlorine, then extracted with caustic, and finally treated with hypochlorite. The alkaline extraction may be with either hot or cold caustic. Heikkila et al teaches that the relative merits of extraction with cold, versus hot, caustic are discussed at length by M. Weyman in The Bleaching of Pulp, W. Howard Rapson, editor, TAPPI Monograph Series No. 27 (1963), Technical Association of the Pulp and Paper Industry, New York, N.Y., Chapter 5, pp. 67-103. Weyman concludes that cold caustic extraction is the superior method for xylan removal from pulp. Other procedures disclosed in the Heikkila et al patent that can be used to recover xylan include filtration, centrifugation, or the like (see column 7, 4th paragraph) and nanofiltraion (see column 7, 5th paragraph). It is also noted that the aqueous caustic treatment in the Heikkila et al patent may be performed at a temperature of 50°C (see column 6, line 46), which is within the range of the temperature of the caustic solution set forth in instant Claim 9. Also see the xylan composition set forth in Example 18 of the Heikkila et al patent which comprises a xylose content of 91.4% which embraces the requirement of instant Claim 23 wherein the hemicellulose has a xylose content of greater than 90 wt%. The difference in the instantly claimed of producing xylose and the process for the production of xylose of the

Heikkila et al patent is the recitation of specific measurements in the instant claims (i.e., removal of 80% of the original lignin content of the plulp or the pulp having an ISO brightness of 88% or higher). These measurements are not recited in the Heikkila et al patent. However, in view of the analogous procedures taught in the Heikkila et al patent for removing lignin and bleaching of the pulp, such measurements would not be substantially different from the products disclosed in the Heikkila et al patent if such measurements were performed. Applicants are reminded that the Office is in no position to determine experimentally whether of not, in an invention such as that at issue, the subject matter is the same as that of the reference. Accordingly, in such instances, this shifts the burden to the Applicants who have the resources to make such a determination and is in a better position to determine experimentally the differences between the invention as claimed and that of the art. *In re Pye*, 355 F2d 641, 148 USPQ 426 (CCPA 1966). It is noted in the instant specification (see 2nd paragraph on page 3) that the use of certain separation procedures, such as alcohol precipitation or chromatographic separation, are not required in the instant claims. However, the broad claims as currently written do not negate such procedures. One having ordinary skill in the art would have been motivated to employ the process of the prior art with the expectation of obtaining the desired product because the skilled artisan would have expected the analogous starting materials to react similarly. Accordingly, it would have been obvious to one of ordinary skill in the art at the time of Applicants invention having the Heikkila et al patent before him to carry out the instantly claimed method of producing xylose from a cellulose material in view of their closely related structures of the starting materials and the resulting expectation of xylose having similar properties for use as sweets and flavouring for food products and as starting material in the production of xylitol.

Information Disclosure Statement

8. The information disclosure statement filed March 11, 2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all

other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Summary

9. All the pending claims (1-46) are rejected.

Examiner's Telephone Number, Fax Number, and Other Information

10. For 24 hour access to patent application information 7 days per week, or for filing applications, please visit out website at **www.uspto.gov** and click on the button "Patent Electronic Business Center" for more information.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Everett White whose telephone number is (571) 272-0660. The examiner can normally be reached on Monday-Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James O. Wilson, can be reach on (571) 272-0661. The fax phone number for this Group is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (571) 272-1600.

E. White

E. White

James O. Wilson
Supervisory Primary Examiner
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